



## Executive Summary

### Fisherman's Landing Northern Expansion

Environmental Impact Statement



# Executive Summary

## Introduction

This Environmental Impact Statement (EIS) has been prepared for the proposed Northern Expansion of the existing Fisherman's Landing Reclamation Area (the Fisherman's Landing Northern Expansion) at the Port of Gladstone, Central Queensland. The EIS has been prepared in accordance with the Terms of Reference (ToR) for the project.

### ***The Proponent***

The Gladstone Ports Corporation (GPC) manages the Port of Gladstone and is the Project Proponent. GPC is a Government Owned Corporation under the *Government Owned Corporation Act 1993*. The key contact for the project is:

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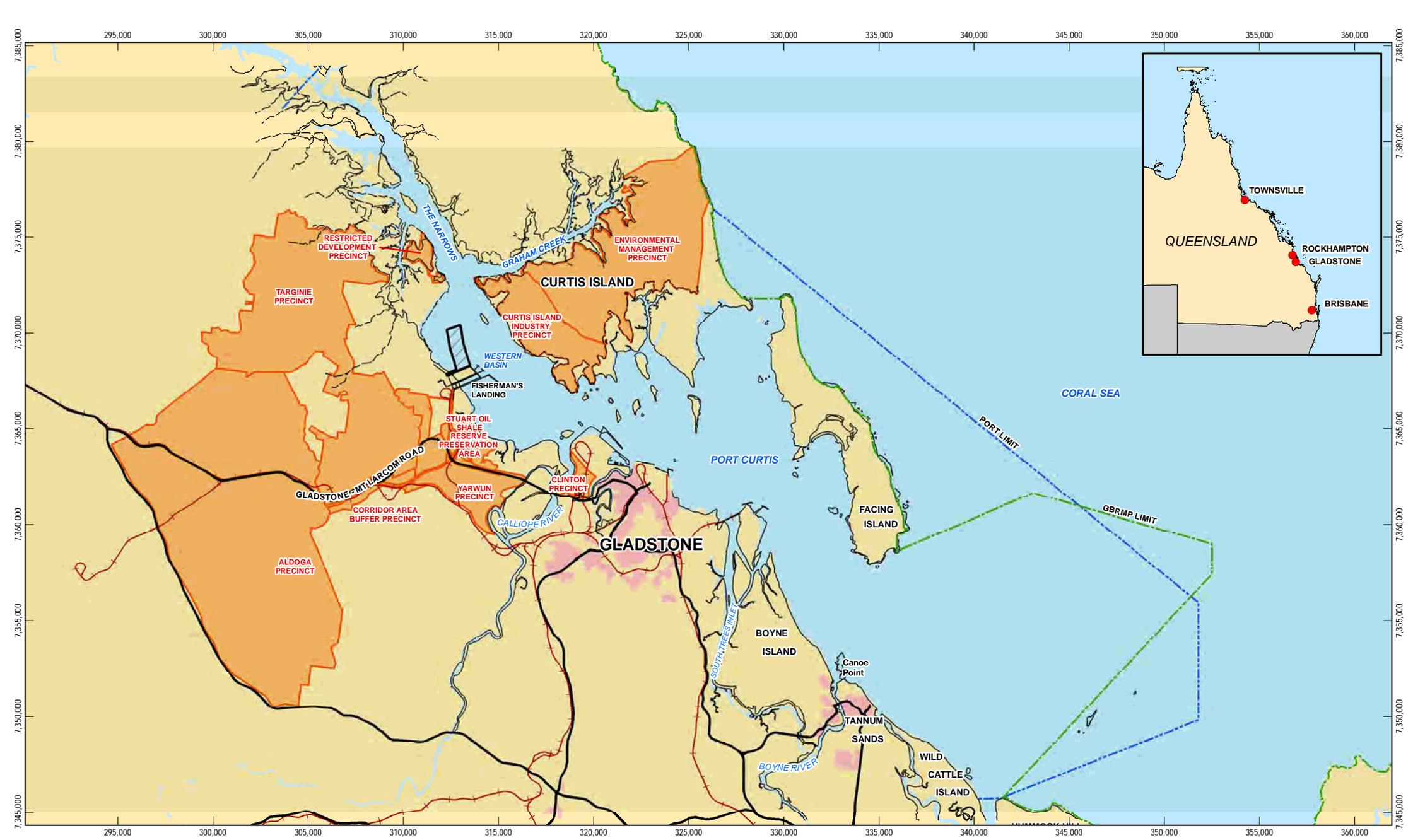
### ***Project Description***

Fisherman's Landing is situated in the Port of Gladstone, 10 kilometres (km) north of Gladstone City. Gladstone is located on the eastern seaboard of Australia, approximately 500 km north of Brisbane and 100 km south of Rockhampton on the Capricorn Coast of Central Queensland (Figure E-1).

The proposed project consists of a Northern Expansion of the existing Fisherman's Landing reclamation through the reclamation of an additional 153 hectares (ha) adjacent to the existing port facility. The reclamation will provide additional land to support the future construction of six wharves and for the development of associated transport, storage, loading and unloading facilities. A bund wall will be constructed and the area will be reclaimed using dredged material from future capital and maintenance dredging programs in the Port. This project also addresses the proposed capital dredging to deepen and widen the Targinie Channel and Fisherman's Landing Swing Basin, which provide shipping access to the current Fisherman's Landing reclamation. The capital cost of construction of the reclamation bund has been estimated to be approximately \$82.5 million in 2009 dollars.

### ***Project Context***

Following the commencement of the Fisherman's Landing Northern Expansion EIS, planning for the proposed LNG industry in Gladstone progressed significantly. As a result, GPC commenced the Western Basin Dredging and Disposal Project EIS in parallel with the Fisherman's Landing Northern Expansion EIS. The Fisherman's Landing Northern Expansion is progressing separately as it is required to service GPC's immediate needs, including the provision of land that can support additional wharves associated with the adjacent GSDA. The requirement for this project to proceed is independent of the Western Basin Dredging and Disposal Project.



1:250,000 (at A4)

0 1 2 3 4 5  
Kilometres (at A4)

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 56



**LEGEND**

- Port Limits
- Major Road
- Railway

- Proposed Fisherman's Landing Northern Expansion
- GBRM Park Boundary (Commonwealth)
- Gladstone State Development Area
- Urban Area



Fisherman's Landing Northern Expansion EIS Job Number 42-15386  
Revision A  
Date 28 May 2009

**Location of the Proposed Northern Expansion of the Fisherman's Landing Reclamation, Port of Gladstone**

**Figure E-1**

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Data Sources: Port Facilities, Reclamation Area - ©The State of Queensland (Gladstone Ports Corporation) 2009. 250K Topo Data - ©Commonwealth of Australia (Geoscience Australia) 2006. GBRMPA data ©Commonwealth of Australia (Great Barrier Reef Marine Park Authority) 2008.  
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### ***Project Objectives and Scope***

The two main objectives for this project include the provision of additional land adjacent to wharves for import and export of materials to and from the Gladstone State Development Area (GSDA) and the provision of a location for the disposal of dredged material from capital and maintenance dredging in the Port.

This EIS addresses the following:

- ▶ Construction of the outer bund wall from bluestone material sourced from the GPC owned quarry on Guerassimoff Road;
- ▶ On-road haulage of rock materials from the quarry to the reclamation if a low construction rate is adopted;
- ▶ Capital dredging of the expansion of the Targinie Channel and Fisherman's Landing swing basin;
- ▶ Placement of dredged material into the reclamation and management of decant waters; and
- ▶ Final capping and surface stabilisation once the reclamation is completely infilled.

Although future capital and maintenance dredging projects are likely to seek approval to deposit dredged material in the Fisherman's Landing Northern Expansion reclamation area, they would be subject to discrete assessments. This project addresses only the capital dredging of the Targinie Channel and Fisherman's Landing Swing Basin.

### ***Environmental Impact Statement Process***

The Project was declared by the Queensland Coordinator-General (CG) as a "significant project for which an EIS is required" under Section 26 of the State Development and Public Works Organisation Act 1971 (SDPWO Act) on 14 October 2005. Under Part 4 of this Act, the Proponent is required to prepare an Environmental Impact Statement (EIS) for the Project.

The proposed Fisherman's Landing Northern Expansion has undergone referral in accordance with the EPBC Act and the responsible Minister determined that the proposal is not a controlled action (30 January 2001). This means that further consideration of the proposal under the EPBC Act is not required.

### ***Public Consultation Process***

GPC commenced formal consultation with the community and stakeholders in early 2009 and has implemented a Stakeholder Consultation Plan. Stakeholder consultation activities have also been implemented to align with the requirements for the Social Impact Assessment (SIA) component of the EIS.

A preliminary stakeholder list was developed through desk-based research, analysis of existing information materials and through contacting local and state community groups and organisations. The preliminary stakeholder list was expanded through recommendations made by stakeholder participants during implementation of consultation activities. Communication materials were developed to help facilitate the two-way flow of information between the project team and stakeholders and to record stakeholder feedback.

Throughout February and March 2009, the consultation team held meetings with relevant stakeholders of the project. The feedback received from the consultation process highlighted key issues/concerns

regarding the Fisherman's Landing Northern Expansion. These issues and concerns have helped to inform the SIA program and have been incorporated into other technical studies as part of the EIS process.

### ***Legislative Framework***

The site of the proposed Fisherman's Landing Northern Expansion falls within the Curtis Coast Coastal Management District, is currently below high water mark within Port Limits and is unallocated state land under the administration of the Department of Environment and Resource Management (DERM). The Project Area is within the boundaries of the Gladstone Regional Council (GRC, formerly part of the Calliope Shire). The proposed expansion of Fisherman's Landing is located within the Great Barrier Reef World Heritage Area (GBRWHA) but it falls outside the Great Barrier Reef Marine Park (GBRMP). The Project Area is shown as future port development in the Central Queensland Ports Authority's (now GPC) Strategic Plan 1997 – 2047. It is GPC's intention to gain ownership over the land once it is reclaimed and apply for the area to be designated Strategic Port Land.

The Acts, State Government Policies, Local Government planning controls, local laws and policies that have relevance to the project and against which it is assessed are:

- ▶ *Commonwealth Legislation*
  - *Environment Protection and Biodiversity Conservation Act 1999*
  - *Great Barrier Reef Marine Park Act 1975*
  - *Native Title Act 1993*
- ▶ *State Legislation*
  - *State Development and Public Works Organisation Act 1971*
  - *Integrated Planning Act 1997*
  - *Land Act 1994*
  - *Environmental Protection Act 1994*
  - *Marine Parks Act 2004*
  - *Coastal Protection and Management Act 1995*
  - *Transport Infrastructure Act 1994*
  - *Aboriginal Cultural Heritage Act 2003*
  - *Fisheries Act 1994*
  - *Mineral Resources Act 1989*
  - *Petroleum and Gas (Production and Safety) Act 2004*
  - *Water Act 2000*
  - *Vegetation Management Act 1999*
  - *Nature Conservation Act 1994*
  - *Transport Operations (Marine Safety) Act 1994*
  - *Transport Operations (Marine Pollution) Act 1995*
- ▶ *State Policies*
  - *State Coastal Management Plan*
  - *Curtis Coast Regional Coastal Management Plan*

- SPP 2/02 – *Planning and Managing Development involving Acid Sulphate Soils*
- SPP 1/02 – *Development in the Vicinity of Certain Airports and Aviation Facilities*
- SPP 1/03 – *Mitigating the Adverse Impacts of Flood, Bushfire and Landslide*
- SPP 2/07 – *Protection of Extractive Resources*
- ▶ Local Government planning controls, local laws and policies
  - *Gladstone Port Strategic Plan 1997 – 2047*
  - *Gladstone Port Authority Land Use Plan, 1999*
  - *Calliope Shire Planning Scheme 2007*
  - *Development Scheme for the Gladstone State Development Area, 2008*

## Project Need and Alternatives

The Commonwealth and Queensland governments have identified Gladstone as a port with the potential to service future large scale export-oriented, resource processing and value-adding industries. The close proximity of Gladstone's port facilities is an essential component of the economic viability of the Gladstone State Development Area (GSDA). There are few, if any, remaining areas of land immediately adjacent to the port that are suitable for providing storage facilities for the import and export of bulk materials. Therefore, the formation of additional reclaimed land is required to provide these facilities to future industries locating in the GSDA.

Alternative wharf locations have been considered for the establishment of additional import and export facilities. All of these locations are either not suitable or not available to support further bulk goods trade. Therefore, a new facility is required to increase the import and export capacity of the Port of Gladstone to meet future demand.

The construction of a new reclamation provides an opportunity to use dredged material from capital and maintenance dredging projects in the Port to fill the reclamation.

An alternative would be to source fill material for the reclamation from terrestrial quarries. This would still require dredged material to be disposed of elsewhere in the Port or surrounding areas as the current land and offshore disposal areas within the Port are close to or have reached capacity.

Alternative disposal options, such as subtidal locations, offshore disposal grounds, alternative reclamation areas and terrestrial disposal sites were considered and found to be unsuitable for a variety of economic, social and environmental reasons.

## Description of the Project

### ***Dredging and Dredged Material Disposal***

This project addresses the dredging of the Targinie Channel and Fisherman's Landing Swing Basin. The proposed dimensions of this dredging are deepening of the Targinie Channel and Fisherman's Landing Swing Basin and Berth Pockets from -10.6 m LAT to -13.5 m LAT, requiring a volume of 4,000,000 m<sup>3</sup> to be removed. A detailed dredging strategy is yet to be prepared for the proposed capital dredging. Dredging is expected to be carried out utilising a Trailer Suction Hopper Dredger, with the dredged material pumped from the hopper directly into the proposed Fisherman's Landing Northern Expansion reclamation.

### ***Bund Wall Design and Construction***

Bluestone rock materials for construction of the bund walls will be sourced from the GPC owned quarry on Guerassimoff Road. The bluestone material will be extracted and screened at the quarry site to provide the correct sizing for bund wall construction. The bund will be constructed with a core of smaller rock and the outer face of the bund wall will be protected from the impacts of tides and waves by armour rock. The height of the bund walls will be RL 7m Port Datum, with a crest width of 10 m to allow for construction and for traffic to circle the bund wall once complete.

Once a section of the wall is complete and enclosed, dredged material will be pumped into the reclamation, typically through a floating discharge line. The bund will be filled over time using capital and maintenance material. The proposed 153 ha reclamation will require approximately 10,000,000 m<sup>3</sup> of material to infill it. Following completion of filling operations, GPC will undertake capping and seeding of the final surface. Installation of stormwater management measures will also be undertaken progressively.

The inner face of the bund wall will be lined with geotextile fabric to prevent migration of fines through the bund wall. Settlement ponds and weir boxes are proposed to manage the quality of tailwaters and stormwater prior to discharge into the harbour.

The rate at which the bund wall is required to be constructed will depend on the timing and size of dredging programs that will fill the reclamation. If the entire bund needs to be completed in one construction program, this would equate to a rate of approximately 1,800,000 m<sup>3</sup>/year and would take approximately 15 months utilising a contractor. If the bund is required to be constructed at a rate of approximately 400,000 m<sup>3</sup>/year, GPC would use their existing fleet of trucks to undertake construction, resulting in an estimated 3 year construction schedule.

### ***Infrastructure Requirements***

#### Offices

A temporary office facility will be established at the reclamation site for 2 – 3 supervising staff during bund construction. A site office, crib facilities and small workshop comprising up to 40 staff will be established at the reclamation site during the dredging of Targinie Channel and Fisherman's Landing Swing Basin.

#### Transport

Bluestone materials for the construction of the bund wall for the reclaimed area will be transported by road from the GPC quarry, which is located at Guerassimoff Road, approximately 4 km from Fisherman's Landing.

Workers travelling to the reclamation site are expected to travel out of town along the Gladstone – Mt Larcom Road to the quarry site at Guerassimoff Road during bund wall construction and to reclamation during dredging of Targinie Channel and Fisherman's Landing Swing Basin. A small staff carpark will be established at the reclamation site during dredging.

There is no requirement for transport of construction materials or workforce to the reclamation site by rail or ship.

#### Services

GPC will not be providing electricity, gas, raw or treated water, telecommunications or sewerage to the reclamation during the bund construction and infilling phase of the project. Temporary facilities and services will be provided at the temporary site office and workshop.

### Navigational Aids

Maritime Safety Queensland (MSQ) will advise the requirements for installation of navigational lighting on or adjacent to the bund wall during construction and operation. Where navigational lights are required to be installed along the bund wall, these will be solar or battery powered. MSQ has indicated that six channel markers and three beacons will need to be relocated as a result of the proposed LNG Ltd Stage 1 dredging (being assessed under a separate approval), therefore no further relocation or installation of markers and beacons will be required for the Targinie Channel and Fisherman's Landing Swing Basin capital dredging.

### **Waste Management**

The generation of wastes during the construction phase of the project is expected to be minimal given that facilities on the site will be limited to a small site office for 2 – 3 staff during bund construction and a site office, crib facilities and small workshop comprising up to 40 staff during dredging. Wastes will be appropriately segregated and stored on site and regularly removed to licensed facilities by licensed waste contractors.

A greenhouse gas (GHG) assessment was carried out to assess potential sources of greenhouse gas emissions from the construction of the Fisherman's Landing Northern Expansion. The estimate of construction phase emissions totalled approximately 33,300 t CO<sub>2</sub>-e with almost 90% of these emissions being due to dredging activities. Consequently, the GHG emissions potentially being generated from the main sources during the construction phase of this project could be approximately 0.02% of the annual baseline emissions profile for the State of Queensland. Possible mitigation options for the construction phase of the project were identified and described.

## **Site Area**

### **Environmental Values**

A number of general environmental elements for the Project Area are described.

#### Topography

The entire area of the proposed Fisherman's Landing Northern Expansion site is currently underwater at the mean low-water-spring tide level (0.67 m above Lowest Astronomical Tide (LAT)). The 2007 tide tables for Gladstone also suggest that the proposed Fisherman's Landing Northern Expansion was submerged at the lowest recorded spring tides of 0.3 m above LAT. Following completion of construction, the project will be above the high water mark, with the bund wall being at RL7m.

#### Geomorphology

The estuaries along the Curtis Coast represent a series of drowned valleys submerged with rising sea levels. Filling of the valleys with sediments from both fluvial and marine sources would have occurred during the Holocene (last 10 000 years) sea level rise. The predominantly tidal flats of fine sediment that are present today indicate low energy deposition of a marine dominated rather than a fluvial dominated deposition regime.

#### Geology

The geology underlying the proposed Fisherman's Landing Northern Expansion is described as Quaternary Holocene deposits (Qhm) – Mangrove swamps, mudflats and saltpans. Immediately landward of the reclamation area the geology is described as Quaternary age alluvium (Qha) – Gravel, sand, silt, clay and alluvium. Site investigations indicated that the local geology at site level comprises

estuarine clay (0.5 m to 5.0 m thickness) overlying marine and residual clays (siltstone source). Some areas may contain gravel and/or sand layers, more commonly in the first 10 m below seabed.

#### Soils

An acid sulphate soil investigation was carried out with thirty locations being drilled under the proposed bund wall. Laboratory analysis suggests that the existing acidity in the seabed sediments to around 2 m depth is not significant; however, concentrations of sulfidic material in 96% of the samples analysed suggests the potential for acid generation if the material becomes oxidised.

#### Land Use

The Project Area is currently used for recreational and commercial fishing activities and supports seagrass communities. There are no residential areas close to the Project Area and only three scattered, rural dwellings remain on large allotments within the GSDA. There is no agricultural activity close to the Project Area.

The current Fisherman's Landing port facility adjacent to the proposed Fisherman's Landing Northern Expansion supports wharves for Rio Tinto Alcan Yarwun (RTAY) and Cement Australia as well as a multi user bulk liquids wharf. Orica Australia has a bulk liquid ammonia storage tank on site and RTAY has caustic bladder storage facilities on site. Nearby facilities include the Orica Ltd Chemical Manufacturing Plant, Gladstone Area Water Board (GAWB) Water Treatment Plant, Gladstone Regional Council Sewage Treatment Plant, RTAY Alumina Refinery, Cement Australia clinker, cement and lime plants and the Queensland Energy Resources Shale Oil Plant (currently non-operational).

#### Sensitive Environmental Areas

The Port Limits are wholly contained within the GBRWHA and partly contained within the GBRMP to the east of Facing Island in the outer harbour. The Fisherman's Landing Northern Expansion is not located within the GBRMP. Other protected areas within the Port of Gladstone Limits include Rodds Bay Dugong Protection Area (DPA), the Port Curtis Wetland (QLD019), a Habitat Protection Zone under the GBR Coast Marine Park in The Narrows. Colosseum Inlet and Rodds Bay Fish Habitat areas are located to the south of Port Curtis. There are no Ramsar listed wetlands within the Port Limits, however, Port Curtis is listed in the Directory of Important Wetlands.

#### Visual Amenity

Within the vicinity the landform is characterised by flat tidal and inter-tidal areas dominated by mangroves, extending into the foothills and ranges of the surrounding mountains, including Mt Larcom, which is a dominant landscape feature of the region. Curtis Island, located to the north-east of Gladstone has an undulating landform that provides a vegetated backdrop to the visual landscape. Key viewpoints for the project are Mt Larcom and adjacent ranges, Curtis Island, Port Curtis and Auckland Point, Round Hill and the elevated sections of Gladstone.

#### Native Title

There are a number of traditional owner groups in the Port Curtis area. There is a Native Title Claim (QC01/29) over the Gladstone region and Port Curtis Coral Coast (PCCC) Native Title Claim Group is the Claimant. The portion of the Project Area comprising the waters of the Gladstone Harbour is not subject to a current native title claim or Aboriginal Cultural Heritage Body and has not been subject to a native title claim at the time of or since the introduction of the *Aboriginal Cultural Heritage Act 2003*.

## ***Potential Impacts and Mitigation Measures***

### Land Use Suitability

The construction of the Northern Expansion to the existing Fisherman's Landing reclamation will result in a change of land use from marine waters to reclaimed land which will be designated Strategic Port Land. This change in land use will prevent the current uses of the area, which are marine habitat and recreational and commercial fishing, but is consistent with the adjacent land use.

### Land Contamination

The Project Area is not currently contaminated, therefore, there is no requirement to manage the disturbance of contaminated areas during construction. There is the potential for the site to be contaminated during construction through the spillage of oils and fuels from construction equipment. This will be managed through implementation of measures to protect the environment from spillages from machinery.

There is the potential for oxidation of Potential Acid Sulphate Soils (PASS) as a result of the mobilisation of sediments into more oxygen-rich water and potential for exposure of sediment at low-water-spring-tides in western parts of the development area. In particular, a mud wave may be formed by bund wall construction. The Environmental Management Plan for bund construction will include a requirement to monitor surface water quality throughout the construction period. Any material that is displaced above LAT or its current elevation will be managed in accordance with an Acid Sulphate Soils Management Plan (ASSMP). Bund construction methods that assist in minimising the production of a mud wave will also be employed.

### Land-Based Fill

Approximately 1.5 million cubic metres of rock material, sourced from a GPC owned quarry on Guerassimoff Road, will be required to construct the bund walls. All rock of resource value in the quarry was categorised as bluestone, which is not expected to result in impacts on water quality when placed in the marine environment. The rock will be extracted and screened at the quarry site, including scalping of the fine fraction (<12 mm) to reduce the potential for generation of turbid plumes through the introduction of fines into the harbour.

### Visual Amenity

The reclamation works will create a ground level of approximately 5.5 m above mid tide level, thereby limiting the visual impact of construction operations. All construction activities will be undertaken during daylight hours with no lighting required. Dredging may result in a dredge plume being visible from some locations. The construction effects of the project on landscape and visual amenity will be minimal.

The construction of the reclamation will have a moderate impact on the amenity and character of the waters of Port Curtis. The reclamation will also have a minor impact on the view from Mt Larcom. Impacts on viewpoints from Gladstone city were not considered significant.

Mitigation measures to reduce adverse impacts on landscape character and visual amenity include minimising the clearance of mangroves, shaping external bund to promote natural recruitment of mangroves, removal of temporary barriers and signage when no longer required, ordered storage of machinery and access roads to be maintained free of dust and mud. Overall, landscape and visual impacts of the project both during construction and when the site is complete are assessed as being of Minor Adverse Significance.

### Lighting

No bund construction will be undertaken at night and the only lighting to be provided on the final reclamation will be navigational lighting. Dredging associated with the Targinie Channel and Fisherman's Landing Swing Basin will be undertaken as a 24 hour a day operation and some lighting will be required on the dredger, supporting vessels and on the reclamation to maintain safe shipping and a safe construction site. Therefore, minimal impacts of lighting on the public or nocturnal and marine fauna are anticipated for this project.

## Transport

### **Environmental Values**

There are two proposed routes for the haulage of rock from the GPC owned quarry on Guerassimoff Road:

- ▶ Crossing Landing Road from State land and utilise Serrant Road and the Materials Transport Services Corridor; and
- ▶ Entering Landing Road from State land and following Landing Road to the north.

Landing Road is the main north-south access spine for this area of the Yarwun Precinct of the GSDA and the quarry for the proposed Fisherman's Landing Northern Expansion is located to the west of Landing Road near the end of Guerassimoff Road. The proposed reclamation is located in the Harbour east of Landing Road and is accessed by either Serrant Road and the Materials Transport Services Corridor or the end of Landing Road that curves around to join the Strategic Port Land fronting the Harbour.

### **Potential Impacts and Mitigation Measures**

Potential impacts on transport infrastructure from the construction of the Fisherman's Landing Reclamation include the haulage of rock for the construction of the bund wall from the GPC quarry at Guerassimoff Road to Fisherman's Landing and workforce traffic. Minimal impacts on rail, air or sea transport during the construction or operational phases of the reclamation are expected.

### Haulage of Rock

The two haulage rates and methodologies being considered for hauling the bluestone from the quarry to the reclamation based on the rate of construction are:

- ▶ A 400,000 m<sup>3</sup>/year haulage rate, which is scaled to suit the current fleet of vehicles operated by GPC and will utilise road registered vehicles for haulage operations (Low construction rate). This rate would result in up to 150 truck circuits per day; and
- ▶ A 1,800,000m<sup>3</sup>/year haulage rate, which will require a contractor to carry out the operation using mine haulage vehicles without using public roads with the exception of road crossings (High construction rate). This rate would result in up to 200 truck circuits per day.

If the construction rate is ~1,800,000 m<sup>3</sup>/year, GPC will undertake a specific haul route study and will obtain approvals to establish a dedicated, off road haul route to minimise impacts on traffic, road user safety and Council road surfaces.

If the haulage rate is ~400,000 m<sup>3</sup>/year, two on-road haulage routes are under consideration:

1. Crossing of Landing Road and using Serrant Road; and
2. Using Landing Road north of Serrant Road and the Strategic Port Land at the end of Landing Road.

For the first option, GPC will maintain Serrant Road during its use as a haulage route and replenish gravel pavement on the road ensure that there is an adequate depth of gravel remaining for a 4-5 year life. Should the pavement area where the haul route crosses Landing Road become distressed or need repair, the GPC will carry out the repairs to GRC approval or engage the GRC to perform the agreed repair work.

For the second option, impacts would be upon the capacity at the Landing Road – Serrant Road intersection, and pavement impacts along Landing Road north of Serrant Road from the heavy vehicles. A Basic Right Turn Treatment (BAR) may be required to be constructed on the Serrant Road side of the intersection to allow vehicles to slip around a truck turning right into the haul route to the quarry. If Landing Road is used as a haulage route between Serrant Road and Forrest Road, the haulage activity will have a significant impact on the life of the existing pavement. These impacts will be evaluated once the haul route is chosen by GPC.

#### Workforce Traffic

The effect of the bund construction or dredging workforce travelling to and from the reclamation site in cars would add no more than 30 to 40 vehicles per day to the traffic on Landing Road during either bund construction or dredging, and hence is well below the 5% change threshold that would trigger any assessment of impacts on the State or Council controlled road network. Given the very low workforce numbers, there are no impacts expected on traffic or road surfaces resulting from travel of the workforce to and from site.

## Climate and Air Quality

### ***Environmental Values***

#### Climate Factors

- ▶ The average annual rainfall for Gladstone over a 51 year period from December 1957 to January 2009 is 877 mm. The wet season occurs during the summer months, with December, January and February accounting for 47.4% of the annual average rainfall.
- ▶ On average, the highest average minimum and maximum temperatures are in January (23°C to 30.6°C) whilst the lowest average minimum and maximum temperatures occur in July (11.8°C to 22.8°C). The long-term annual average range for this site was reported as 18°C to 27.2°C.
- ▶ Annually, the 9 am and 3 pm relative humidity averages are 64 % and 54 % respectively.
- ▶ On average, at 9 am, wind speeds between 20 and 30 km/h are from the south-easterly direction. At 3 pm, wind speeds between 20 and 30 km/h are mostly from the east and north-easterly direction and wind speeds between 30 and 40 km/h were from the easterly direction.

#### Extremes of Climate

Drought has occurred in the Gladstone area due to high temperatures and low rainfall over the past decade. Ten tropical cyclones passed within 100 km of Gladstone between 1940 and 2006 and in March 2009, Tropical Cyclone Hamish passed along the coastline near Gladstone causing the temporary closure of the Gladstone Port. Numerous flood events have been recorded for Calliope River, the closest river to the Project Area, since the installation of a gauging station on the in 1938. Storm tides were recorded in the Gladstone region in 1974 and 1980, with an 0.4 m surge.

## ***Potential Impacts and Mitigation Measures***

### Vulnerability of Area to Natural or Induced Hazards

Tropical cyclones and the associated extreme wind, rain and wave conditions may result in some level of damage to the rock armouring of the bund wall. As the proposed Fisherman's Landing Northern Expansion is not adjacent to any major river or creek, it is not expected that flooding following large rainfall events will result in inundation or scouring of the reclamation. The reclamation will be vulnerable to the impacts of storm tides, however, the rock armour protection is based on a dynamic design and therefore, will move to create a stable profile over its lifetime. Bushfires and landslides do not pose a risk to this project.

### Climate Change Adaptation

The main climate change variables that were flagged as having the most significant potential impact on this project were sea level rise and associated increase in storm surge. The sea level rise adopted for the design of the rock armour is as recommended by the DERM Building and Engineering Standards for Tidal Works and corresponds with the approximate 'high level' mean sea level rise projections for a 50 yr period. If a design storm event occurs during the lifetime of the structure, some maintenance and possibly replenishment of the rock armour may be required in places.

It is expected that the potential impacts of climatic factors, extreme climatic events, natural or induced hazards and climate change on the construction and operation of facilities that may be constructed on the reclamation in the future will be considered by the future proponents.

### Soil Erosion

After the bund wall is completed and the reclamation is infilled, GPC will cap and revegetate the surface to prevent erosion based issues. GPC will install stormwater management measures to reduce impacts on soil erosion from stormwater flows and maintain an appropriate quality of stormwater discharge.

### Impacts on Air Quality

The main impacts on air quality from this project will be vehicle emissions and dust, however, these are not expected to result in impacts to sensitive receivers or the general public. Dust will be managed through the use of water trucks as required and vehicle and machinery emissions will be kept to a minimum through regular vehicle maintenance, good driving practices and ensuring standard emission reduction devices remain on the vehicles. Dredging will also result in exhaust emissions, however, these impacts will be transient and will not result in a permanent, long term change to air quality in the region.

## **Marine Water and Sediment**

### ***Environmental Values***

#### Overview

Environmental values and guidelines for the marine waters of the study area were identified from the *Queensland Water Quality Guidelines 2006 (QWQG)*, ANZECC (2000) Guidelines for Fresh and Marine Water Quality, State Coastal Plan, Curtis Coastal Plan. Relevant sediment quality guidelines include the National Assessment Guidelines for Dredging (NAGD) and Draft Guidelines for Assessment and Management of Contaminated Lands in Queensland. The environmental values established for this project include modified aquatic ecosystem, recreational uses, industrial uses, human consumer, wetland, indigenous traditional owner cultural resources and values, habitat for native and migratory animals, habitat for native plants, nursery habitat, fishing and localities for maritime infrastructure.

### Water Quality

A detailed review was undertaken of previous water quality studies around the proposed Fisherman's Landing Northern Expansion between 1995 and 2009. In the proposed Fisherman's Landing Northern Expansion area, pH generally complied with guidelines ranging from pH 7.0 to pH 8.5, however, total suspended solids and nutrient concentrations are variable and frequently exceed ANZECC (2000) and QWQG (2006) guidelines. Some studies have shown that the concentrations of metals in the area have exceeded guidelines for the protection of aquatic ecosystems.

Turbidity is the main water quality variable of relevance to this project. Turbidity in inshore marine systems can vary over quite short time periods from influences such as wind, wave action, rainfall events, and other disturbances of the sediment into the water column. Existing water quality information for Port Curtis shows that tidal movements, water depth and runoff as well as wind direction and speed can all influence turbidity in Port Curtis to varying degrees. This is particularly the case in the proposed Fisherman's Landing Northern Expansion area and other intertidal areas of Port Curtis because of the shallow depths and soft sediments in these areas.

The review of turbidity dynamics from previous relevant studies indicates that Port Curtis has high natural variability in particle concentrations throughout the water column because of various environmental conditions such as tidal state, wind, waves and rainfall influences. Turbidity can range between peaks over 100 NTU, but generally are above the QWQG (2006) of 6 NTU and below the ANZECC (2000) guideline of 20 NTU. Turbidity appears to be higher and more variable on the tidal flats of Fisherman's Landing than in the adjacent deeper waters. In the shallower tidal areas, it appears that resuspension from wind induced waves may also contribute to elevated turbidity.

### Sediment Quality

Three recent sediment sampling programs for capital dredging projects have not identified any contaminants of concern above the NAGD (2009, formerly the National Ocean Disposal Guidelines for Dredged Material 2002) Interim Sediment Quality Guideline low screening levels or Environmental Investigation Levels (EILs). While low concentrations of some contaminants of concern have been present in individual samples from maintenance dredging material in the shipping channels and swing basins in sampling programs undertaken in 1992, 1996, 2000 and 2006, the overall material to be dredged has been compliant to NODGDM (2002) (and therefore the NAGD 2009) sediment quality guidelines and has been approved for unconfined ocean disposal at the East Banks Sea Disposal Site.

Sampling and analysis of sediments was undertaken under the proposed bund wall footprint. All compounds were compliant to EILs (EPA 1998) and NAGD (2009) guidelines, where available. Eleven boreholes were collected and analysed within the proposed footprint of the Targinie Channel and Fisherman's Landing capital dredging. Surface samples from each core were analysed for a range of contaminants and potential acid sulphate soils. Results were compliant to the EILs and NAGD (2009) sediment quality guidelines. Acid sulphate soils testing indicated that the risk of oxidation of PASS during dredging and reclamation was below the criteria that require action and management. Based on the results of the sampling and analysis, it is considered that the sediments to be dredged are suitable for placement within the proposed Fisherman's Landing Northern Expansion.

### **Potential Impacts and Mitigation Measures**

The following are key potential impacts of the project on water and sediment quality.

#### **Impacts of the Construction of the Reclamation on Water Quality**

- ▶ Remobilisation of soft sediments during placement of rock is expected only for the initial layer of the bund wall, as additional rock will be placed on rock minimising further seabed sediment disturbance. If required, the deployment of a silt curtain will be investigated, although silt curtains are unlikely to be effective due to the relatively high current velocities;
- ▶ The potential for erosion of core material by waves during potential storm conditions will be managed by placement of armour material to the exposed face of the core material and minimising the length of unprotected core section;
- ▶ The potential for spillage of oils and fuels from construction equipment to occur will be reduced by eliminating construction plant refuelling and maintenance activities on site;
- ▶ Fines (material <12 mm) will be scalped from core material for the bund wall, removing this potential source of turbid plume generation during construction;
- ▶ To minimise the migration of fines through the bund wall and into the surrounding waters, geotextile fabric will be placed on the inner face of the bund before the commencement of filling operations;
- ▶ Following completion of the reclamation, increased tidal currents are expected at the northern end of the bund wall on both ebbing and flooding tides. Although increased turbidity through increased scour of the soft seabed sediments might occur initially, equilibrium is expected to be reached;
- ▶ Modelling results show that the flushing efficiency of the water body to the west of the reclamation becomes less efficient towards the south eastern corner of the reclamation. However, the reduction in flushing is only 10% from the current level of flushing in this area and significant impacts on the seagrass, mangrove and intertidal communities are not expected; and
- ▶ Following the completion of the infilling of the reclamation, GPC will cap and grass the surface of the reclamation to manage the quality of stormwater discharge.

#### **Potential Impacts of Dredging and Decant on Water Quality and Sensitive Habitats**

Variable turbidity regimes in the Project Area suggest that existing seagrass species distributions are adapted to temporal changes in turbidity. Site specific water quality objectives have been nominated for turbidity, based on the range of natural conditions which the existing marine communities currently experience. Taking these factors into account, turbidity concentration in the outfall (measured in the receiving environment immediately adjacent to the outfall from the reclamation) should not exceed 30 NTU. Modelling of the potential plume discharged from the reclamation indicated that 100 NTU is a suitable water quality trigger value for the final decant cell within the reclamation as this it will achieve the water quality trigger value of 30 NTU nominated for the receiving environment.

To achieve the nominated water quality objectives, multiple cells, connected via weir boxes with adjustable gates, will be established within the reclamation to allow the finer materials to settle out of suspension. The control measures will be re-assessed if the turbidity exceeds 100 NTU in the final reclamation cell or 30 NTU at the outfall or if the visible plume extends beyond the spatial extent indicated by the modelling.

The mangrove communities in the vicinity of the proposed Fisherman's Landing Northern Expansion are adapted to the turbid near shore environments. The turbid plume from the Targinie Channel and

Fisherman's Landing swing basin dredging and decant from the reclamation is not expected to substantially increase turbidity along the shoreline where there are mangroves within the Project Area.

### **Potential Impacts of Sediment Quality during Dredging and Reclamation**

As the concentrations of potential contaminants in the sediments underlying the proposed Fisherman's Landing Northern Expansion are compliant to the NAGD (2009) and EILs (1998), sediment mobilisation is not expected to introduce contaminants into the water column during bund wall construction.

Sediment disturbance could result in moving PASS material from an anoxic environment close to the seabed into the more oxygen-rich waters near the surface, however the material will remain wet thus limiting the rate of oxidation of any material entrained in the water column.

The sediments to be dredged from Targinie Channel and Fisherman's Landing Swing Basin are suitable for placement in the Fisherman's Landing Northern Expansion. All future dredging programs will be required to undertake sampling and analysis of sediments to be dredged and if contaminants are identified, appropriate management measures will be put in place during disposal of the material into the Fisherman's Landing Northern Expansion reclamation.

## **Coastal Processes**

### ***Environmental Values***

#### Physical Processes

Processes transporting sediments in Port Curtis are dominated by tidal currents driven by the relatively large spring tides, coupled with a mild wave climate that stirs up sediments in the shallower areas at times of low tide. Important but infrequent drivers are extreme events like cyclones, which can generate high waves and water levels that can have major environmental effects. The large tide range and associated high tidal currents means that the estuary waters are well mixed with only minor variation in density of dissolved or suspended material through the water column. Curtis and Facing Islands protect the Project Area from ocean waves to the east and hence the wave action at the Project Area is relatively mild.

#### Morphology and Integrity of Existing Landforms

The existing reclamation at Fisherman's Landing was constructed in the early 1980's and consists of a perimeter bund armoured on the outside with a widely graded rock. The perimeter bund has formed a stable revetment for the existing reclamation. The closest channel to Fisherman's Landing is the Targinie Channel that provides shipping access to the four berths that utilise the existing reclamation for their connecting infrastructure (conveyors, pipelines, services, access). Currently, the Targinie Channel is 120 metres wide and is maintained to a depth of -10.6 m LAT through maintenance dredging.

#### Relationships of Existing Processes on Coastal Processes, Siltation and Morphology

Port Curtis has a relatively high tidal range and tidal compartment producing tidal currents up to 1.5 m/s in the main channels and up to 0.3 m/s on some of the shallower areas. These velocities are capable of moving large amounts of sediment depending on the water depth and wave action. In deep areas, tidal currents are the dominant force for sediment movement and in shallower areas, where tidal currents are smaller, it is the combination of wave action and tidal currents that is important.

### **Potential Impacts and Mitigation Measures**

Potential impacts on coastal processes were identified and mitigation measures identified where required.

#### Wave Climate

On the eastern, western and northern sides of the reclamation, the following changes to wave height are predicted:

- ▶ East of the reclamation there is a small increase (5%) in the amount of wave height for waves coming up the channel and the reclamation blocks the small amount of waves from the western sectors;
- ▶ On the western side of the reclamation the reclamation blocks all waves from the southern and eastern sectors; and
- ▶ On the northern end of the reclamation there is a significant reduction in wave height from the southerly sector.

#### Hydrodynamic Processes

Modelling was undertaken for three scenarios:

- ▶ Base case – Existing conditions including dredging in the Wiggins Island area (already approved);
- ▶ Reclamation – Base Case with reclamation area at Fisherman's Landing; and
- ▶ Reclamation + Dredge – reclamation scenario with dredging in the Targinie Channel and Fisherman's Landing Swing Basin.

Impacts on tidal currents (direction and velocity) and water levels as a result of the reclamation and dredging can be summarised as follows:

- ▶ The most noticeable effect on the tidal flow occurs to the immediate north of the proposed Fisherman's Landing Northern Expansion, where predicted increases in tidal velocities from a base case of 0.3 m/s are 0.6 m/s and 0.8 m/s on the ebbing and flooding tides respectively;
- ▶ The impacts of the reclamation and dredging on the main channel include an increase of up to 0.3 m/s in the velocities in the main channel north of the existing reclamation for both ebb and flood tidal flows, attributed to the narrowing of the waterway due to the reclamation;
- ▶ A reduction of around 0.3 m/s in the flows in the vicinity of the existing Fisherman's Landing berths under both ebb and flood flow conditions, which is directly attributable to the increased water depths from dredging of the channel;
- ▶ Minor changes to tidal velocities (<0.2 m/s) are expected along the main channel south-east of Fisherman's Landing and in between the islands opposite the RG Tanna Coal Terminal. These differences are not considered to be significant compared to the maximum tidal velocities, which reach 1.5 m/s in this area under existing conditions;
- ▶ There are no significant differences in water levels for the developed cases compared with the base case for Auckland Point, Fisherman's Landing Berth and the Entrance to the Narrows; and
- ▶ At the north east of the reclamation area, the level of low tide will be decreased and the time of low tide will be about one hour later. At the south east of the reclamation area, a similar effect is noted. While the time of low tide and the depth of the low tide are predicted to change, the length of time that the tide is low is not predicted to change substantially.

### Impacts of Dredging and Bund Wall Construction

Impacts of the dredging and bund wall construction were assessed for the western, northern and eastern sides of the reclamation and other areas within the Port based on changes to hydrodynamics and the associated changes to sand transport and silt deposition potential (determined by changes to bed shear stresses):

- ▶ On the western side of the reclamation, this area is likely to become shallower as suspended sediment brought in by the tide drops out of the water column. This will potentially create new habitat for mangrove colonisation;
- ▶ On the northern side of the reclamation, the area generally will deepen, with maximum scour occurring near the northern end of the reclamation and tapering away to nil change at the northern and western extremities of the area;
- ▶ On the eastern side of the reclamation, the construction of the reclamation makes no difference to the wave energy or tidal velocities in this area, however, there is a general increase of up to 0.3 m/s in the main channel opposite the reclamation and a general decrease of up to 0.3 m/s between the existing reclamation and North and South Passage Islands opposite. This reduction is directly attributable to the increased water depths from dredging of the channel;
- ▶ In other areas, some minor increases in the net sand transport potential in the main channels extending down harbour to Auckland Point is predicted, however, these increases will not have any significant effects; and
- ▶ Based on the predicted changes to the sand transport potential, there is the potential for sand to be scoured from the channel adjacent to the proposed Fisherman's Landing Northern Expansion and be deposited in the swing basin that services the existing Fisherman's Landing berths. There is, therefore, potential for an increase in the maintenance dredging required in the Fisherman's Landing swing basin after the reclamation has been constructed.

## **Noise and Vibration**

### ***Environmental Values***

#### Baseline Monitoring at Noise Sensitive Receivers

Unattended noise monitoring was undertaken at two locations around the Project Area to gain an appreciation of the ambient noise environment at nearby sensitive receivers. Attended noise monitoring was also undertaken on to supplement logger data as well as at several locations around the Project Area.

#### Noise Criteria

Construction activities should be in accordance with general building work hours as described under Section 440R – “Building Work” of the QLD *Environmental Protection Act 1994*. Under the regulation, no audible noise is permitted at the following times:

- ▶ 6.30 pm to 6.30 am – Monday to Saturday; and
- ▶ Sundays and public holidays.

Guidance on the assessment of operational noise impacts is provided within the EPA *Planning for Noise Control Guideline 2004* (PNCG). The EPP (Noise) 2008 states that for a protected area, or an area identified under a conservation plan under the *Nature Conservation Act 1992* as a critical habitat or an

area of major interest, the acoustic quality objectives are 'the level of noise that preserves the amenity of the existing area or place'. For this project, protected areas are a declared Dugong Protection Area, the Great Barrier Reef Marine Park and the Great Barrier Reef Coastal Marine Park (State).

### ***Potential Impacts and Mitigation Measures***

#### Noise Sources

Sources of noise and vibration during construction sources will include tip trucks for importing the fill material, earthmoving machinery and other smaller construction vehicles. Construction activities will be undertaken between the hours of 6.30 am and 6.30 pm, Monday to Saturday. No construction activities will be undertaken on Sunday's or public holidays. Any works scheduled outside these hours will comply with the night-time site specific noise criteria identified for the two sensitive receivers.

#### Noise Impacts on Sensitive Receptors

The following noise impacts on sensitive residential receivers and protected areas were predicted from noise modelling undertaken for the construction phase of this project:

- ▶ The predicted noise impact levels are below the ambient and background noise levels and comply with the worst case night time site specific criteria of 45 dB(A) for the receiver on Fisherman's Road and 25 dB(A) for the receivers on Targinie Road;
- ▶ Noise levels from construction activities were predicted at the protected habitat area approximately 2,500 m north of the Project Area to be 32 dB(A) and is likely similar to the ambient noise levels experienced in an area such as this; and
- ▶ Noise levels on nearby tidal flats will range from 40 – 55 dB(A) during construction activities, which are similar to noise levels experienced adjacent to other GSDA sites and in natural environments during windy conditions or elevated insect noise.

#### Road Traffic Noise

During maximum quarry production of 1.8 million m<sup>3</sup> per year there will be approximately 200 truck movements a day on the haul road from 6 am to 6 pm. The traffic generation due to haulage of quarried material is not expected to increase traffic noise significantly and should not have an effect on the amenity of residences in the area.

#### Impacts of Noise on Marine Fauna

Underwater noise will be generated by dredging and the nature of dredging noise is that it occupies the mid- to low- frequency range, is tonal and continuous. Available information relating to the sensitivity of cetaceans and dugongs to dredging noise indicates that dredging is not considered to pose a significant risk. Literature relating to noise impacts on turtles is also limited except that turtles do not appear to change behaviour due to noise. No mitigation measures are considered necessary in relation to noise and vibration from dredging due to the minimal anticipated impacts.

#### Construction Vibration

Local sensitive receivers might perceive construction vibration at times, however, the level of annoyance will depend on individuals. In the context of the Project, the nearest sensitive receivers will be located further than 500 m of the construction activities, and as such, no appreciable impact is expected.

### Mitigation Measures

Construction noise is not likely to have a significant impact on the local ambient environment, however, to minimise noise emissions, plant related vehicles will be serviced, fitted with mufflers and eliminating exhaust brake usage.

## **Nature Conservation**

### ***Environmental Values***

#### Mangrove and Saltpan Communities

Approximately 1.897 ha of intertidal vegetation occurs in the proposed Fisherman's Landing Northern Expansion. The majority of this vegetation (1.447 ha) is closed mangrove forest to 5 m tall, dominated by *Rhizophora stylosa* (red mangrove). The species composition, land form and substrate correspond with the description of RE 12.1.3 (VMA Status: Not of Concern). Behind the mangrove community is a small area (0.45 ha) of sparse saltpan vegetation on marine clay. This community consists primarily of patches of *Sporobolus virginicus* (saltwater couch), samphire species and bare mud. The species composition, land form and substrate correspond with the description of RE 12.1.2 (VMA Status: Not of Concern).

#### Seagrass Communities

An initial baseline study of Port Curtis and Rodds Bay in 2002 identified 135 discrete seagrass meadows. Four meadows were identified in close proximity to Fisherman's Landing and these have been monitored on an annual basis. These meadows have varied in area and biomass from year to year. In a regional context the species composition of the intertidal meadow that is partially located within the Project Area was identified as light *Z. capricorni* with *H. ovalis*. Thirteen other large intertidal meadows also had this specific species composition, totalling 1,377 ha, and an additional 12 large meadows had the same dominant species (2,632 ha). The species composition of the coastal subtidal meadow located within the Project Area was identified as light *H. decipiens* with *H. ovalis*. Whilst none of the other 11 coastal subtidal meadows shared this specific composition, six were dominated by the same species (94.2 ha), and three were dominated by other *Halophila* species (24 ha).

#### Benthic Communities

The Centre for Environmental Management (CEM) at the Central Queensland University (CQU), in conjunction with GPC, conducted a long term Port Curtis Macrobenthic Monitoring Programme from 1995 – 2003. The most abundant macrobenthic group were molluscs (41% of total abundance), whilst polychaetes were the second most abundant group (21%). Temporal trends were evident with species abundance, richness and diversity higher in November compared to April for all sites. Spatial trends showed Fisherman's Landing to have low species abundance, richness and diversity compared to reference sites (Curtis Island and Graham Creek).

The intertidal environment available as habitat for macroinvertebrate communities in the Project Area includes both natural (soft sediment flats) and man-made (rock bund walls) features. Soft sediment flats support seagrass meadows, mangrove areas and bare flats. Given the local extent of similar intertidal habitats, it is unlikely that the assemblages present in the intertidal areas within and adjacent to the Project Area are locally or regionally unique.

#### Listed Marine Fauna

A search of the Commonwealth EPBC Protected Matters online search tool revealed 21 listed marine fauna species that occur or have the potential to occur in proximity to the Project Area.

An aerial megafauna survey was undertaken in an area extending from Rodds Bay in the south, encompassing the entire coast of Curtis Island, to Port Alma in the north where dugong, dolphins, turtles, sharks, rays and seasnakes were observed. With the exception of sharks and rays, all of these fauna species were recorded within or adjacent to the Project Area. A previous study determined that the dugong density in the immediate vicinity of the Project was less than 0.125, giving the area a low dugong conservation value relative to surrounding areas. Areas of higher conservation were found in the region, including Rodds Bay to the south and Port Clinton and Shoalwater Bay to the North, which have high dugong conservation values.

#### Introduced Marine Species

An introduced marine species survey of Port Curtis was undertaken in 2000 to assess the distribution, abundance and risk of introduced marine species within the Port of Gladstone. This survey found that none of the marine pests targeted by the Australian Ballast Water Management Advisory Committee were present in the Harbour, however, nine introduced species were present.

#### Recreational Fisheries

The use of the area for recreational fishing is governed by the seasonality of targeted species, the tidal signature of the area, and the amount of time available for fishing activities. Recreational fishing undertaken in the area mostly occurs on the weekends both from the shore and from recreational vessels. Consultation indicated that Blue Salmon, Barramundi, Triple tail, Mud Crabs and prawns are routinely caught in the Project Area and immediate surrounds.

#### Commercial Fisheries

Approximately six commercial operations utilise the Project Area and surrounds undertaking activities such as setting pots to collect mud crab, fish netting, and trawler thoroughfare through Targinie Channel (but no trawling).

#### Terrestrial Fauna

Terrestrial fauna species observed during GHD surveys included the mangrove gerygone, grey fantail, collared kingfisher, silvereeye, white-faced heron, striated heron and straw-necked ibis. Intertidal mudflats represent rich feeding grounds for migratory waders. Bird species observed at the mudflats during field surveys were the whimbrel, pied oystercatcher, black-winged stilt, sharp-tailed sandpiper, common tern and silver gull.

Nine migratory bird species may occur or have the potential to occur in proximity to the Project Area. Those observed in GHD surveys were the whimbrel, sharp-tailed sandpiper and common tern. EPBC listed Marine species observed in GHD surveys were the silvereeye, straw-necked ibis, black-winged stilt and silver gull. For bird species observed and listed as utilising the Port Curtis area, it is unlikely that these species utilise only the Project Area.

### ***Potential Impacts and Mitigation Measures***

#### Marine Resource Management Areas

The Project is not expected to change the listed status of any management areas that are World Heritage Listed, a declared marine park, dugong sanctuary zoning, on the Directory of Important Wetlands, fish habitat areas, National Estate Registers, Gladstone Port Limits or Pilotage Area.

#### Mangrove and Saltmarsh Communities

During construction, relatively small losses of 1.447 ha of mangrove and 0.45 ha of saltmarsh communities will occur at the proposed Fisherman's Landing Northern Expansion. The physical removal

of these communities has the potential to cause direct mortality to individual animals that are residing within this area at the time of clearing. Potential indirect impacts include degradation of fauna habitat due to increased sedimentation, altered local hydrology, pollution or potential disturbance of acid sulphate soils and indirect impact to fauna breeding and feeding activities through noise, dust and light disturbance.

Mitigation measures to minimise the impact on the intertidal vegetation relate to providing marine offsets for loss of mangrove and saltmarsh communities, using a qualified fauna spotter during tree clearing activities, the implementation of an Acid Sulfate Soils Management Plan (ASSMP) and incorporating appropriate pollutant removal devices in decant and stormwater systems.

#### Seagrass Communities

The construction and operational activities of the Project have the potential to directly and indirectly impact on the seagrass communities. Direct impacts include the removal of approximately 2.74 ha and 86.44 ha of seagrass from Meadow 8 and Meadow 9, respectively, giving a total of 89.18 ha. The Project will directly remove 0.66% of the total area of seagrass identified in the 2002 baseline survey.

Indirect impacts to the seagrass communities outside of the Project footprint are related to impacts on water quality and to predicted changes in tidal velocities, bed shear stress and water levels on the tidal flats surrounding the Project Area. Predicted changes have the potential to partially or completely smother the existing seagrass beds and/or seed banks with sediment in some areas on the western side of the reclamation, reduce the area of suitable seagrass habitat at the northern end of the reclamation and increase the amount of subtidal seagrass habitat compared to intertidal habitat as a result of increased water depth at low water.

Mitigation measures include the development of suitable offset measures to account for the direct and indirect loss of seagrass and suitable seagrass habitat. GPC will continue to contribute to both the DEEDI long term seagrass monitoring program and Port Curtis Integrated Monitoring Program (PCIMP) and the seagrass monitoring program will specifically assess the impacts of construction of the reclamation on the adjacent seagrass communities.

#### Benthic Communities

The Project has the potential to impact the benthic communities of Port Curtis directly and indirectly through the direct removal of benthic organisms, the loss of benthic habitat and changes to coastal processes. Considering the small size of the Project Area, and that the benthic communities found in and adjacent to the Project Area are not unique in the Port Curtis region, it is unlikely that the Project will adversely affect the Port Curtis benthic community as a whole.

#### Listed Marine Fauna

Potential construction impacts on listed marine fauna include the direct loss of food resources and foraging habitat, the physical capture of individuals inside the reclamation area once the bund is closed, and the capture and strike of individuals during dredging operations. Dugong (*Dugong dugon*) and green turtle (*Chelonia mydas*) are species most likely to be impacted by seagrass meadow removal. While a potentially high value food resource will be lost, dugong will continue to feed in the area on meadows of similar and varying species compositions. Dolphins may be impacted by the removal of foraging habitat, however, as these species are highly mobile and in the regional context the habitat loss is minimal, it is unlikely that these species will be adversely affected by the Project.

Mitigation measures include suitable seagrass offset measures and netting of the bund prior to the closure of the bund to minimise the incidence of marine fauna stranding within the reclamation area.

Dredging activities will operate under an approved EMP that includes the use of turtle exclusion devices where relevant, minimising off-bed suction time to reduce the risk of turtle capture, use of a fauna spotter during dredging activities and the keeping of a log of listed marine fauna observed during dredging operations.

#### Introduced Marine Species

Dredge vessels have the potential to act as a vector for marine pest incursions. Prior to the establishment of any dredge vessel within Port Curtis, the vessel will undergo a risk assessment, taking into account the recent history of the vessel, including recent ports of call, any previous marine pest incursions, previous treatments and inspection outcomes.

#### Recreational and Commercial Fishing

Potential impacts on the local recreational and commercial fisheries include the direct removal of 153 ha of potential fishing grounds, and the possible establishment of restricted areas in the vicinity of the Project during construction for security and safety reasons. Construction activities may also reduce local yields as targeted species may move away from the area to avoid the disturbance.

Mitigation measures will include minimising disturbance of the marine environment to the Project footprint. Commercial fishing offsets are not directly addressed in this EIS. GPC will participate in any future negotiations led by the Queensland State Government as part of the management of commercial fishing impacts in the Western Basin of the Port.

#### Terrestrial Fauna

Potential impacts to the terrestrial fauna include direct and indirect mortality, and the loss of habitat and feeding sites. Migratory wetland bird species and some migratory terrestrial bird species may inhabit intertidal areas at Fisherman's Landing, however, it is unlikely that these species utilise the Project Area other than as a flyover area. Clearance of intertidal vegetation will result in a localised reduction in the amount of refuges, microhabitats, nest sites and food available for a number of native fauna species. However, given the relatively small area of habitat to be cleared and the availability of similar habitat within the adjacent vegetated areas, this loss of resources is not expected to have a significant impact on the abundance or species richness of native fauna in the Project Area.

Mitigation measures to be implemented during construction include the protection of native fauna, the clear identification of the areas to be cleared, minimal disturbance to adjacent intertidal vegetation, survey for raptor nests prior to clearing of mangroves and the use of a qualified fauna spotter during vegetation clearing. During operations regular monitoring of the condition of surrounding intertidal vegetation and relevant dust suppression measures will be adopted.

## **Cultural Heritage**

### ***Environmental Values***

#### Indigenous Cultural Heritage

The Project Area is situated partially within the external boundaries of the registered Port Curtis Coral Coast (PCCC) native title claim as this claim area includes a small area of land in the south west of the Project Area along the shoreline but does not include Gladstone Harbour waters. The Project was informed that applicants for the PCCC native title claim wish to be endorsed as Aboriginal Parties for the south west portion of the Project Area comprising the small area of land impacted on by the Project. The Project received a formal response to the notification to the PCCC Aboriginal Corporation and GPC

responded, endorsing the PCCC as Aboriginal Parties. No further responses to the notification were received.

A Cultural Heritage Management Plan (CHMP), pursuant to Part 7 of the Act, is currently being developed for the Project. The intention of the parties entering into the CHMP is to have the CHMP agreement registered by the Chief Executive of the Department of Environment and Resource Management.

Searches of relevant registers and databases were undertaken and one site of natural heritage significance was identified on the Register of the National Estate in proximity to the Project Area. This is described as Place ID 18811, Balaclava Island and The Narrows, Curtis Island, Queensland, Australia. No known Aboriginal cultural heritage is listed on these registers within the Project Area, however, a midden site is listed in close proximity to the Project Area.

#### Non-Indigenous Cultural Heritage

Searches of National, State and local heritage registers did not identify any places and sites of cultural heritage significance potentially impacted by the project. A site survey was undertaken and no places of historical interest or sites of potential historic heritage significance were identified. The potential for currently unknown historic heritage sites or places, or the potential for a sub-surface historical archaeological record being present is regarded as nil and low to nil respectively.

### ***Potential Impacts and Mitigation Measures***

#### Indigenous Cultural Heritage

The Indigenous assessment of impacts will be carried out as part of the CHMP. As yet, this has not been finalised. Protection, management and mitigation measures will be discussed by the Cultural Heritage Committee after cultural heritage surveys are complete, and will then be developed into a specific Management Plan required by the CHMP.

#### Non-Indigenous Cultural Heritage

The Project Area is unlikely to contain historic heritage sites or places, or a sub-surface archaeological record.

## **Social**

### ***Environmental Values***

#### Community History

Prior to European settlement, the Gladstone region was home to the Baijali (or Byellee) and Goreng Goreng Aboriginal tribes. The Gladstone region has more recently been governed as individual shires/cities including Calliope Shire, Gladstone City and Miriam Vale Shire, which were recently amalgamated into the Gladstone Regional Council (GRC). The GRC covers an area of 10,488 km<sup>2</sup>, containing an estimated resident population of 51,351 (in 2006) and has no internal council boundaries/divisions.

#### Population and Demographics

The data shows fluctuations in the percentage of annual population change for the GRC area, with a notable reduced rate of population growth in 2005. Fluctuations are possibly associated with major industrial development peaks and troughs. In 2006 the population of the local study area was 45,625

indicating a 9.73% increase since 2001. Continued population growth in the GRC area is expected with the average annual change in the GRC area higher than that projected for Queensland.

#### Sport and Recreation

Fishing is by far the most prominent recreational activity undertaken in and around the proposed Fisherman's Landing Northern Expansion. Gladstone Harbour is closed to commercial fishers from Friday 6 pm until Sunday 6 pm, to provide access for recreational fishers.

#### Community Values

Gladstone City and the surrounding region have a history of strong economic growth based around industrial development, port facilities and extraction of natural resources. The broader Gladstone regional communities typically place a lesser value in local heavy industry as these areas are characterised by extensive quality agricultural lands and agriculture is still one of the main industries. Various local and regional environmental groups also identified that strong community value is placed on the area's natural assets, promoted as an attractive lifestyle choice and desirable tourist destination.

### ***Potential Impacts and Mitigation Measures***

#### Population and Demographics

Population influx and change in demographic structure of the local community were considered. The potential impacts on these were considered negligible, as it is expected that at peak construction the project would demand approximately 30 fulltime workers and GPC proposes to utilise its existing workforce to cater for this demand. Consequently, the Fisherman's Landing Northern Expansion project is not expected to impact on the current population of the Gladstone region or change current projections for the region's population growth.

#### Health and Safety

Potential impacts relating to health and safety were identified as significant due to reduced road safety and reduced safety of recreation opportunities. If public roads are used for transporting rock from the quarry to the reclamation site, construction associated traffic may reduce road safety for the public on the streets along the transport corridor. The proposed construction works may impact on the safety of marine based recreation activities (e.g. fishing, boating and jet skiing). While the consequence of this impact may be major, the likelihood of the impact occurring will likely be minimised through the appropriate implementation of construction exclusion areas.

#### Quality of the Living Environment

The noise and vibration study identified that the potential social impact from increased noise and vibration is considered negligible, as the Project Area is located distant from existing residents. The visual impact assessment identified no significant landscape or visual impacts due to the low lying nature of the proposed development. Reduced visual amenity might be experienced by stakeholders who work adjacent to the Project Area (namely commercial fishers), recreational users of the Project Area and adjacent areas (namely recreational fishers and boaters), visitors to the area and environmental groups. The Project is expected to increase the industrial focus of the area.

#### Disruption to Existing Use

Potential social impacts relating to use and access include reduced access to recreation opportunities, an increase in prohibited activity and reduced access to culturally important areas and landscapes. It is likely that the proposed Fisherman's Landing Northern Expansion will involve exclusion zones to mitigate public safety and security issues thereby reducing access by recreational users. Development of the

proposed Fisherman's Landing Northern Expansion may encourage illegal usage of exclusion zones, especially as the area is currently known as a productive fishing location, posing an increased risk to the safety of people accessing prohibited areas. There may be reduced access to some culturally important areas, especially for indigenous groups. Consultations with the PCCC identified various sites within the close vicinity of the project that are important for traditional practises. It is possible that some of these sites may be impacted to such an extent that traditional practises, such as food collecting, hunting and fishing are no longer possible.

#### Socio-Economic Impacts

The expected impact on Indigenous employment opportunities, State labour markets and increases in direct local expenditure is considered negligible due to the limited workforce demand of the Project. The Project is expected to have a neutral impact on the local labour market given the low workforce numbers.

A potential significant impact is the reduced viability of commercial fishing as the proposed Fisherman's Landing Northern Expansion is located in an area that is currently used for various commercial fishing purposes. Consultation meetings with commercial fishing representatives identified that the area's commercial fishes are heavily reliant on the existing tidal movement along the mainland coast. Commercial fishers may be particularly sensitive to impacts on Blue Salmon catches, as the Fisherman's Landing and Friend Point areas are the most productive Blue Salmon areas in Gladstone Harbour.

## Health and Safety

### ***Environmental Values***

#### Air and Noise

The noise assessment identified that the predicted noise levels at the two nearest sensitive receivers for this project are below the ambient and background noise levels and comply with the worst case night time site specific criteria of 45 dB(A) for the receiver on Fisherman's Road and 25 dB(A) for the receivers on Targinie Road.

The main air quality impacts from bund construction will be vehicle emissions and dust, however, these are not expected to result in impacts to sensitive receivers or the general public. Dredging will also result in exhaust emissions, however, these impacts will be transient and will not result in a permanent, long term change to air quality in the region.

#### Disease Vectors

Mosquito and biting midge have public health implications particularly since this project is near the coastal area. Project activities may also be expected to create potential mosquito and biting midge breeding. Gladstone area has many species of mosquitoes, which are potential carriers of Ross River Virus, Barmah Forest Virus and Dengue Fever.

### ***Potential Impacts and Mitigation Measures***

#### Potential Impacts on Workforce

The potential health and safety hazards to personnel on site during the bund construction were identified. These risks will be mitigated by the use of appropriate Personal Protective Equipment (PPE) and training. The Project Area is likely to have breeding sites for mosquito and biting midge which may expose workers to potential health impacts. Management plans for both these health and safety issues have been developed.

### Impacts on Community

Potential impacts on the community include noise level impacts, air quality impacts, mosquito and biting midge impacts and dredging impacts. Anticipated noise levels were within the site specific noise criteria developed for the sensitive receivers for this project. Dust is the predominant health and safety issue for communities and this will be managed through the use of water trucks on unsealed surfaces. Odour has been considered and will not be of concern for this project. The Project Area is likely to have breeding sites for mosquito and biting midge which will be controlled through a Management Plan.

During dredging campaigns, there will be some impacts to the safety of recreational and commercial vessels utilising the harbour, however these will be managed through issuing of Notices to Mariners by the Harbour Master. Dredging regularly occurs in the Port, therefore this is not an unusual circumstance for harbour users.

## **Economy**

### ***Environmental Values***

It is anticipated that the Fisherman's Landing Northern Expansion project combined with significant working age population growth would contribute to continued growth in construction industry employment in GRC. In 2008, there were approximately 70 major projects in GRC, completed, committed, under construction or under investigation, with a combined estimated cost of \$42.6 billion. There are three major projects directly related to the port and a number of mining projects within the area with an estimated cost of \$1.0 and \$4.7 billion respectively.

### ***Potential Impacts and Mitigation Measures***

#### Results of Cost Benefit Analysis

Factors considered in the cost benefit analysis included construction costs and staging, maintenance costs, dredged material disposal cost savings, property leasing, berth gross operating margin and environmental disbenefits. The results of the cost benefit analysis indicate that the project is economically viable (as indicated by the positive net present value) at the target discount rate of 6%. The discount rate would need to be over 7.20% for the project costs to exceed its benefits.

#### Economic Impact of Constructing the Fisherman's Landing Reclamation

The total construction cost of the Fisherman's Landing Northern Expansion is estimated at approximately \$82,500,000 with construction costs spread out evenly over two years (i.e. 2010 and 2011). The cost benefit analysis adopts similar assumptions. Advice from GPC indicates that the majority of expenditure relating to the construction of the bund will be made within the Fitzroy statistical division.

The annual economic impact of constructing the Fisherman's Landing Northern Expansion over the two year period is estimated at \$80.36 million in output (or consumption), including an indirect impact of \$39.11 million, \$12.56 million in household income, including an indirect impact of \$8.16 million, 270 full time equivalents, including 160 indirect full time equivalents and \$25.64 million in value added, including \$16.13 million in indirect value added.

## Hazard and Risk

### ***Environmental Values***

#### Dangerous Goods

The project will use a number of substances listed in the Australian Dangerous Goods Codes, however, these substances will be contained within construction, dredging and site vehicles and will not be stored on site. Vehicles will be refuelled and maintained at the quarry site or at GPC workshops at RG Tanna Coal Terminal and Barney Point Coal Terminal, which are managed under separate approvals. The dredger will be refuelled at a bunkering facility.

#### Natural Hazards

The potential for natural hazards, such as cyclones, flooding and earthquakes have been assessed. Consequences of a cyclone can include a combination of flood, storm tide inundation, strong winds and landslide. GPC will monitor for severe weather warnings from Bureau of Meteorology and provide advice to contractors working on this project.

There have been four earthquakes with magnitude of five or greater recorded in Gladstone region in the last 100 years. Design considerations will adequately address the earthquake risks for construction of bund by adhering to relevant Australian Standards.

### ***Potential Impacts and Mitigation Measures***

#### Preliminary Hazard Analysis

The Hazard and Risk assessment has identified the nature and scale of hazards that might occur during the reclamation and dredging at Fisherman's Landing. The study identified a total of 20 hazards that resulted in seven high risk, 11 medium risk and three low risk hazards before mitigation measures. After mitigation and control measures, it resulted in one high risk, six medium risks, four low risks and nine very low risk hazards. The controls identified when in place will adequately safeguard against safety, asset and environmental consequences from hazards associated with the project.

#### Risk Management Plan

Through the use of hazard analysis, high and medium risks were identified. High risks identified for the project relate to vehicular traffic, acid sulphate soil and construction workplace accidents. GPC will liaise with local government to upgrade infrastructure as required, develop an Acid Sulphate Soil Management Plan and an Emergency Management Plan to manage these risks for this project. GPC will conduct a separate Construction Safety Study before the construction phase after identification of the construction contractor.

Medium risks identified are hazardous materials, disposal of construction waste, disruption to local communities, site sanitation, noise and dust natural hazards. GPC will develop a suitable construction waste management plan, provide adequate site sanitation measures, provide adequate site security and develop an Emergency Management Plan.

## Cumulative Impacts

Any proposed development has the potential to impact upon the environmental, social or economic values of a region as a result of its development. It also has the potential to produce a cumulative impact upon those values when the proposed activity is conducted in combination with other developments. The typical effect is a compounded impact resulting from the interaction of multiple stressors from different projects. To have complete understanding of the full impact of a proposed development, it is necessary to assess the potential cumulative impacts that may result from the project in combination with other projects, as well as assessing the direct and indirect impacts attributable only to the project of interest.

A number of coastal developments are being undertaken in the Gladstone region concurrently including annual maintenance dredging, the Wiggins Island Coal Terminal development, LNG Ltd Stage 1 Dredging at the existing Fisherman's Landing reclamation Bulk Liquids Wharf, the Western Basin Dredging and Disposal Project to facilitate port and LNG industry development, and the construction of marine offload facilities, including associated dredging, on the western coast of Curtis Island to facilitate the import of materials for LNG plant construction.

Potential cumulative impacts across all environmental values were discussed and mitigation measures identified where appropriate. The main areas in which cumulative impacts are likely from concurrent or successive projects occurring within the Port of Gladstone are impacts relating to water quality and marine flora and fauna. While the timing of the future dredging and reclamation projects is as yet unconfirmed, these projects will need to consider the timing of the already approved projects when considering the potential for cumulative impacts to occur.

## Draft Environmental Management Plan

A Draft Environmental Management Plan was prepared for the Fisherman's Landing Northern Expansion Project which provides plans for a number of elements including marine water quality, flora and fauna, storage and handling of hazardous substances, waste management, noise, air quality, visual and amenity, traffic and site access, health and safety, mosquito and biting midge, environmental emergency procedures, management and staff responsibilities, staff environmental training, cultural heritage and fire ants.